

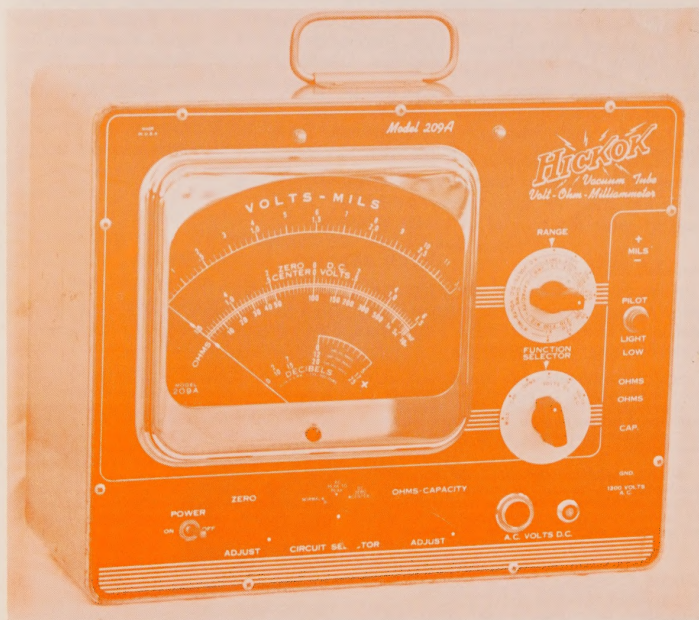
California Antique Radio Gazette

Official Journal, Southern California Antique Radio Society.

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HICKOK 209A (with 10" meter)

Walt Curry Collection

INSTRUMENTS AND MEASUREMENTS ISSUE

SOUTHERN CALIFORNIA ANTIQUE RADIO SOCIETY

Incorporated, Non-profit Organization

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SCARS is a non-profit organization. Its purpose is to preserve the history of wireless communication by encouraging the acquisition, preservation and exhibition of antique wireless and radio apparatus and publications pertaining to its history and development.

SCARS promotes contacts social through meetings held four times a year at various locations in Southern California. Featured at these meetings are contests, swap sessions and talks by members and guests on subjects of interest to collectors.

The club publishes quarterly the *California Antique Radio Gazette* which features news of club activities, hints on restoration, and advertisement of radio related items available for sale or trade. It is furnished free to all members. Ads are printed free for members. SCARS assumes no responsibility for the condition of items sold at swap meets or through *Gazette* ads.

Membership is open to anyone having a genuine interest in preserving the equipment and history of early wireless and radio equipment. Dues are \$10.00 per calendar year.

ADDRESS INQUIRIES TO:

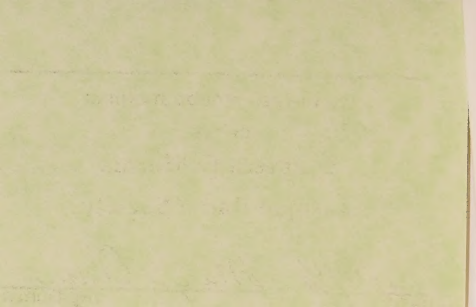
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The opinions expressed in the *Gazette* are those of the authors and may not reflect the opinions of the editors or the SCARS membership.

IS A MEMBER IN GOOD STANDING
OF THE
Southern California
Antique Radio Society

12/31/80 May S. Curry
UNTIL TREASURER

years I am no stranger to radio





PRESIDENT'S MESSAGE

It is a great honor to be president of this very successful organization. And while I have only been a member of SCARS for about five years, I am no stranger to radio collecting.

I remember well the early 1950's. There I was, a boy of ten years, pulling my red wagon to Gray Radio Service in Newark, Ohio and again asking that question I still ask today: "Do you have any old radios?" I am embarrassed to admit it but I used to tear apart some great old sets just for a free supply of parts for my electronics projects. I even tried ham radio but my major QSO consisted of transmitting to a fluorescent bulb with a 6L6, coil and crystal.

It was later in the 1970's that I consciously began the study, appreciation and collection of the antique radio. Someone told me about Morgan's book and I was hooked. A few years later I discovered SCARS.

The Southern California Antique Radio Society is a well-run organization of fellow collectors and historians who volunteer their time for that one objective of preserving the history of radio technology. And as a club, we have a number of ideas. First, we want to establish a Southern California museum of wireless broadcast radios and televisions, literature, etc. If you have any ideas, let Floyd Paul or Morgan McMahon know about them.

We also appreciate your comments on our *Gazette* and suggestions on how to improve the quarter-

ly meetings. Tell us anything that you think would benefit the club.

As president, I feel it mandatory to let you know about the 1988 schedule of activities. On February 20 we return to Burbank with our usual swap meet and an informative program on plastic and transistor radios presented by Walt Curry. On May 21, back to Burbank for our annual auction and picnic lunch, this meeting co-sponsored by the AWA. August 20, Burbank, and a program on how to restore the "all-American 5" with Ed Sheldon. And we plan to hold our annual meeting in Torrance on November 19, 1988. We hope to present a program of entertainment from the early days of radio. All four quarterly meetings will feature a contest, well-organized as usual by Roy and Kathy Tucker.

We are a large club, more than 600 strong and growing. With your involvement and support, we will continue to be a viable voice in the history of radio.

Mike Adams
President

Next Meeting

FEBRUARY 20

**Lockheed Employee
Recreation Club
2814 Empire Ave.
Burbank, CA**

7 to 10:30 A.M. Swap Meet
10:30—11:00 Contest
11:00 Business Meeting
11:30 Program
12:30 Fini

BURBANK MEETINGS

Our host, Bill Welsh, of Lockheed, indicates the parking lot will be open about 7 A.M. on the Saturday mornings of the meeting dates.

NOTICE

Only SCARS members may sell at SCARS meets.

INSTRUMENTS AND MEASUREMENTS

By ED SHELDON

In this issue of the *Gazette*, SCARS presents a series of articles by a number of members which will be of special interest to those who collect test instruments. However, regardless of our interests, we all have a need to use instruments and make measurements as we collect and restore old radio artifacts. I wish to thank all of our authors for their efforts.

The period covered by this series of articles is primarily the 1930's and the 1940's. However it is amazing to see how far back in time the rudiments of some of the instruments go. For example, the concept of the Wheatstone Bridge, the basis of all bridge circuits for measurement of resistance (R), inductance (L), and capacitance (C), goes back to the early part of the 1800's.

In the days of wireless, the instruments and measurement capabilities were mainly concentrated in the large government and industrial laboratories, such as the National Bureau of Standards, the Navy, and the Telephone Company. When radio became popular in the 1920's, and "radio entered the home" as was so aptly stated by the RCA booklet of that name, every repair shop had a need to make measurements of parameters that had been the exclusive province of these large research laboratories. This was the beginning of an instrument and information explosion which is still going on at the present time.

Often I have been asked for information or a circuit diagram for an old-time instrument, so I thought that a listing of some of the books that I have found useful would help other club members.

Useful Books about Instruments

Radio Instruments and Measurements, 345 pages.

National Bureau of Standards Circular C 74. This circular was first issued in March 1918, revised in March 1924, and reprinted in 1937. It contains a wealth of information about measurement techniques used in the early days of radio. It contains an interesting section on the use of buzzer circuits and the spark gap as signal sources in high frequency measurements. A section of formulas and data gives everything you could ever need concerning the calculation of the capacity of condensers and inductances. If you ever need to calculate the inductance of any kind of loop antenna this is the place to find the equations.

Modern Radio Servicing by Alfred Ghirardi. 1302 pages, published in 1935-36. The book contains 424 pages just on instruments that were popular in the 1930's. This is the place to look for pictures and circuit designs of old-time test equipment of all types. The information on radio servicing is also very useful. The book often shows up at swap meets, price at \$6 to \$10.

Any of the series of books by the late John F. Rider are useful and collectible. The best ones for instrument information are: *The Cathode Ray Tube at Work*, 1935; *Vacuum Tube Voltmeters*, 1941; and *The Oscillator at Work*, 1940.

Latest Instruments for Servicing Radio and Television, 1956, by the staff of the Coyne Electrical School. This book contains information on all types of instruments used in radio servicing, with many pictures and diagrams. It also has a chapter on calibration of radio service instruments.

GENERAL RADIO COMPANY 650-A Impedance Bridge

By Floyd A. Paul

The General Radio Company

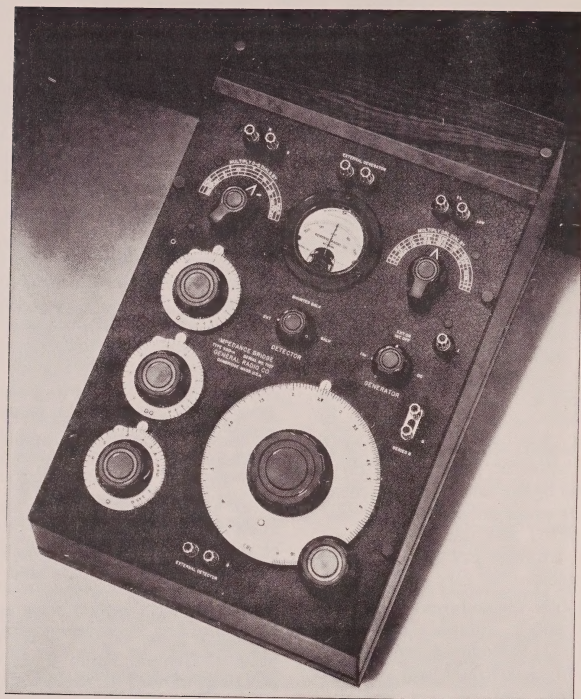
General Radio (GR) instruments in the thirties, forties and fifties were expensive and they were unaffordable (and the accuracies were unnecessary) for use by radio repairmen, but they were considered required equipment by governmental agencies, industrial laboratories, education institutions, and radio broadcast stations. General Radio instruments were conservatively designed electrically and extremely well designed physically. GR equipment was considered "top of the line" by most radio/electronic people. Quality appeared to be one of the predominant controls exercised by the company and GR equipment has experienced an excellent reputation over several decades. Today's radio instrument collectors look at GR equipment as very collectable.

GR 650-A Impedance Bridge

The 650-A Impedance Bridge measures (1) inductance and storage factor, (2) capacitance and dissipation factor, and (3) a-c and d-c resistance. The 650-A instrument was first advertised in the *Radio Experimenter* (In-house GR publication) of May 1933. By 1959 the GR annual sales catalog showed that the 650-A was replaced by a new model, the 1650-A Impedance Bridge. From 1933 until 1957 or 1958 the General Radio Co. never changed the design of the 650-A instrument. This longevity (25 years) in production makes the instrument unique and speaks for the excellence of the original design. During the 1930's the price of the unit was \$175.00. In the 1940's the price rose to \$240.00 and in the 1950's it rose to \$270.00.

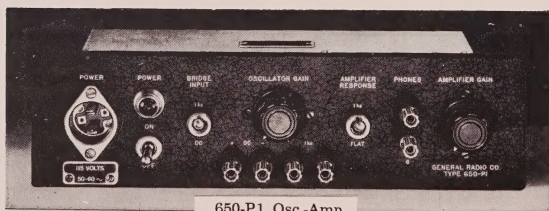
The instrument was advertised as having a 1% accuracy for capacitance and d-c resistance for intermediary multiplier decades, and 2% for inductance. In the 1930's and '40's that was good enough for most applications. After WW-II better accuracies were needed for government work, although for many years the instrument was still very useful. A look at the instrument shows the panel and knob arrangement conveniently laid out for readability and use. The operator will find the dials are appropriately sized and located. Although the bridge's accuracy was advertised as 1%, the repeatability of readings was in the range of 0.1%. The internal 1 kHz hummer provided an a-c source for L and C measurements. The power supply batteries for L, R, and C measurements in the early '30's and '40's were four No. 6 dry cells.

By the mid-'40's an Oscillator-Amplifier unit, 650-P1 was developed by General Radio to do three functions as well as replace the dry cells: (1) provide higher d-c voltage for resistance measurements, (2) provide a 1 kHz oscillator to replace the internal a-c hummer, and (3) provide an amplifier with a voltage gain of about 45 db. The 650-P1 unit was designed to plug into the 650-A bridge box where the four dry cells were located. The oscillator-amplifier unit gave several benefits over the four dry cells as a power source and they were: (1) the vacuum tube oscillator was more harmonic free than the internal hummer, (2) a vacuum tube amplifier increased the sensitivity of detecting nulls with the headsets on a-c measurements, (3) a power supply with an open circuit



TYPE 650-A IMPEDANCE BRIDGE

Courtesy GenRad



650-P1 Osc.-Amp.

voltage of about 190 volts for d-c resistance measurements (increased sensitivity of the instrument on high resistance scales), and did away

with periodically replacing batteries as a power source. For readers interested in the instrument's capabilities, the specification ranges

were:

Parameter	Minimum	Maximum
Resistance	1 milliohm	1 meg
Capacitance	1 mmf	100 mf
Inductance	1 microhy	100 henrys
Diss. Factor	.002	1
Storage Factor	.02	1,000

The instrument was made to be used with either internal or external power sources. The large direct reading dial had a physical length of over twelve inches. The sloping panel of the instrument made reading and adjusting dials easy.

TUNING

One of the fun activities in operating a "three dialer" battery set is in the tuning procedure. The operator has to make several passes at the tuning condenser knobs and the volume control knob before obtaining the best positions of the condensers as well as the desired volume level. The "tuning" of the 650-A Impedance Bridge has a similar operator feeling of exactness. In measuring a capacitor for example: select a decade band range, tune the large direct-reading dial knob, tune the dissipation factor knob, and repeat the previous two adjustments — perhaps several times. Today's digital measuring testers are quicker, can be more accurate, and are more convenient, but to relive the operating conditions that existed in the '30's and '40's and to get the same feeling that our last generation of radio servicemen and radio designers enjoyed, the operator must tune the instrument. This "tuning" experience can be fun and is quite gratifying.

GENERAL

The author used this instrument at the Cal Tech Jet Propulsion Lab

in 1951 while designing test and checkout equipment for flight hardware used in the Corporal Missile Program. My guess is there were a dozen-plus 650-A bridges in use by various departments. The 650-A was an extremely useful general purpose instrument. It is certainly a candidate for the most useful, most classic, best quality built measurement equipment ever built during the 1930 to 1950 era. It was a quite technical instrument in the mid-thirties, and it became an accepted and desired standard in the forties and fifties.

The instrument has been showing up on the surplus market during the past fifteen years in some quantity. Until recently it was still being used by trade schools, research facilities, and the FAA. Surplus sales probably peaked five to ten years ago in the Los Angeles area when the FAA released a large quantity of surplus 650-A's. Used prices have been in the \$35 to \$75 range (a "steal!").

The author's 650-A bridge is cherished because it came from the James Millen Company. It was acquired from Tom Rutherford of Townsend, Massachusetts, who bought all the electronic supplies and equipment at a Millen auction in Malden, Mass., in the late 1970's. The instrument still functions well and appears to be within the original accuracy specifications as advertised when it was sold new about fifty years ago. For those collectors looking for a piece of early test and measuring equipment, look no further. Acquire a General Radio 650-A Impedance Bridge and enjoy.



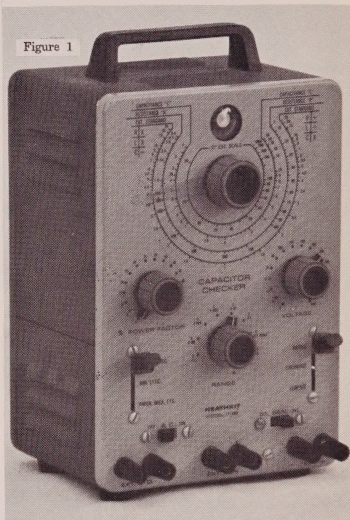
CAPACITOR TESTERS

Featuring the Heathkit IT-28
By Walter Curry

Readers may be surprised to learn that capacitor testers were well established by the advent of wireless telegraphy. Bridge configurations which are used today were used by the Marconi Company and others. A buzzer was typically used as a source of high frequency voltage.

Today, capacitor testers still deserve a place on any electronic repair bench. On older equipment particularly, capacitors are the most commonly failed components; much greater than tubes, resistors or coils, for example. Even paper capacitors which measure acceptably high leakage resistance when cold can take a nosedive when the ambient temperature rises. Hence, commercial antique radio restorers routinely "cap-out" sets, replacing all but mica capacitors to prevent call-backs. In fact it is hard for collectors to restore their favorite radio to original performance without testing and replacing at least some capacitors.

The Heathkit IT-28 (figure 1) is a small, fast, $\pm 5\%$ checker effective for general shop work. It belongs to a class of shop capacitor checkers made largely by the capacitor manufacturers themselves, such as Aerovox, Cornell-Dublier and Sprague. The IT-28 will test old capacitors in the chassis with one lead clipped loose, but perhaps more importantly, it will quickly test all types of replacement capacitors of dubious origin that we buy at swap meets and surplus stores. In this regard, the restorer should buy only capacitors which appear to be recently made. New, old-stock, can be as bad as that found in the set being repaired. Electrolytics dry out with



time, and insulation resistance of paper capacitors deteriorates with time from the effects of moisture and chemical breakdown.

The Heathkit is typical of bench testers whose main function is to test for leakage, power factor, and capacitance. Power factor is a figure proportional to the effective series resistance of electrolytic capacitors, and directly relates to their filtering efficiency. Figure 2 shows the basic bridge circuit of electrolytic capacitors. The eye tube circuit consists of an AC error amplifier driving a rectifier to provide a DC analog voltage of the AC bridge error voltage. The DC voltage is then applied to a magic eye whose shadow angle is proportional to the DC control voltage applied to it, and

therefore is proportional to the bridge error voltage. Thus the eye tube opens as the error voltage approaches zero.

For faster testing, the Heathkit tests leakage on a go-no go basis. The eye tube won't open if leakage current exceeds pre-set limits for paper, minilytic and electrolytic capacitors.

Test leads should be used with caution. Stray lead capacity prohibits their use on the x.0001 scale. Leads must also be kept very short for larger capacitors (10 mf and above) since the bridge sees the lead and clip resistance added to the actual series resistance of the capacitor and will show a higher power factor than is actually the case.

Calibration checks should be made at center scale for maximum accuracy using test capacitors of 200 pf, .02 mf, and 2 mf of known accuracy applied directly to the test terminals.

New electrolytics should be tested for less than 10% power factor and leakage current of no more than 1 to 2 milliamperes after reforming. Electrolytics should be reformed with no more than 10 ma charge current to limit internal heating. Heathkit has an Achilles heel when being used to reform capacitors. The top several resistors on the voltage switch are under-rated and can burn up or change value with a shorted or nearly shorted capacitor. Specifically the problem can be resolved by replacing R30 (refer to IT-28 schematic) with a 10 watt wirewound resistor. R29 should be a pair of 2 watt carbons, and R25 through R28 should be 2 watt carbons. External metering of voltage and charge current is also required for reforming with the Heathkit.

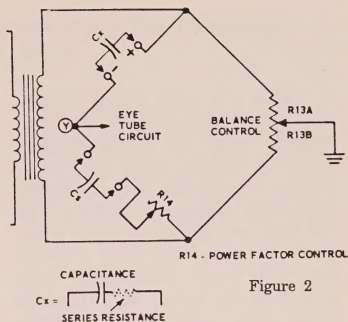


Figure 2

One might ask at this point if a laboratory capacitance bridge such as the General Radio 740-B has any place on the repair bench. Other than the fact that most repair shops couldn't afford them, the answer is yes in the rare cases when accuracy of $\pm 1\%$ rather than 5% is needed. Examples would be in the measurement of fixed oscillator padders to achieve proper tracking, other small capacitors in the RF and IF circuits, and in precision audio compensation networks. Also bridge balance can be achieved with an unmarked, undocumented leaky capacitor so it can be replaced with a new one of proper size. A null cannot be achieved with badly leaking capacitors on the Heathkit or similar repair shop checkers. The GR can also be used to check calibration on shop testers such as the Heathkit.

However, the GR can't replace the Heath or Sprague type units since it has no power supply to reform electrolytics. So, in spite of their limitations, the Heathkits and other low cost instruments, make useful bench testers.

NOTE: A copy of the Heath IT-28 manual (less assembly pages) can be obtained postpaid by remitting \$2.00 to the author.

COLLECTING AND RESTORING TEST EQUIPMENT

By WALTER CURRY

There is a myth among laymen that old test equipment is needed to properly repair old radios. Nothing could be further from the truth. Modern equipment such as digital voltmeters, frequency counters, and low drift, low distortion signal generators are faster and more accurate for repair work. Nonetheless some collectors like to set up impressive "olde tyme radio shoppe" repair benches, well stocked with showy meters and rows of interesting old test equipment that is fun to try out on old sets.

At this time the surplus market still has plenty of bargains in quality used test equipment selling for as little as five to ten percent of their original cost. Beautifully built equipment made by Weston, General Radio, Hewlett-Packard, Fluke, and ESI is sought after by collectors. Some military test equipment is also very good. Hickok made a line of fancy looking repair shop equipment with bright panels and showy meters, perhaps designed to impress potential customers.

With proper restoration this equipment can give your radio repair bench an appearance and capability that old time low overhead repair shops could only dream about. For instance, in the late 1940's when the author worked in a radio repair shop, he was given a tube tester, a volt-ohm-milliammeter, and a signal generator and told to make do.

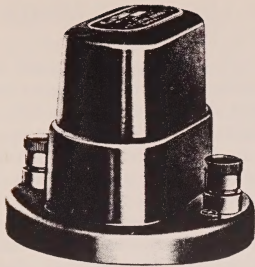
Many collectors like to get their antique radios running and see how well they DX and generally perform. Similarly, one can restore antique test equipment and see how well it functions and whether it is still useful and within rated accuracy and

specifications. Test equipment restoration techniques are similar to those used for radios — cleaning, polishing, replacing defective components, making voltage checks, and checking general performance. Meter movements may require bearing and balance adjustments. Finally, analogous to radio alignment, calibration adjustments are needed to restore peak test equipment performance and accuracy.

Unlike radio alignment, however, calibration procedures have the added caveat of concern for absolute accuracy of calibration. Test equipment is useless unless it is calibrated to give accurate readings. The problem, or challenge is obtaining calibration standards three to ten times more accurate than the equipment being restored without breaking the budget. The following is a list of parameters and suggested standards accurate enough for any repair shop equipment calibration requirements.

D.C. Voltage

Use a high input impedance 3-1/2 digit or better digital voltmeter (DVM) and a variable voltage supply to calibrate other meters directly by comparison. To calibrate the DC ranges on the DVM, shop around for one or preferably three unsaturated standard cells on the surplus market. Get one calibrated and check stability by making sure it tracks the other two with time. Use it to calibrate the basic two-volt range of the DVM directly. To check higher voltage ranges, use a bench DC power supply and a potentiometer made up of precision resistors with the standard cell as a reference and the DVM on lowest voltage range as a sensitive 8 null meter. For example, the 200



Weston Std. Cell

millivolt DC range on my Beckman HD110 will sense a 10 microvolt shift at null and the high input impedance protects the standard cell from current withdrawal at all times.

A.C. Voltage

Use a DVM and a low distortion audio oscillator as an AC supply to calibrate the meters directly by comparison. To calibrate the DVM, obtain a thermocouple voltmeter; calibrate it on DC with the DVM and use as an AC-DC transfer standard.

A.C. and D.C. Current

Calibrate other meters with the DVM directly by comparison. To calibrate the DVM current ranges, measure the voltage drops across selected precision resistors with the DVM using a constant current source.

Frequency

Obtain a counter which will measure period as well as frequency. Using a communication receiver, zero beat the counter clock oscillator against the 10 MHz carrier of WWV. Period measurements are more accurate than direct frequency measurements at lower frequencies. Use the counter to calibrate RF and audio oscillator output frequency.

Resistance

Collect unused .01 to .1% precision resistors in all sizes, .1 ohms to 10 megohms, the more the better. 9

Use to calibrate DVM resistance ranges. Use these for calibrating other ohmmeters directly. These resistors can also be used for constructing potentiometers for AC and DC voltage calibration checks.

Capacitance and Inductance

Collect capacitance and inductance standards. Obtain a surplus .1 to 1% R-L-C bridge. ESI, Fluke and General Radio all built good ones.

In conclusion, an impressive repair bench can be assembled from surplus for pennies on the dollar. Engineers, technicians, hams, and repairmen enjoy being able to buy quality test equipment for their personal use that they saw sell for prices they could not afford when it was new.

ANNOUNCEMENT

I am writing to tell you about the Committee to Preserve Radio Verifications, a project of the Association of North American Radio Clubs. The goal of the committee is to locate QSLs that belong to DXers who are no longer active in the hobby, or QSLs that are in the possession of the families of deceased DXers, and save this material from the loss or destruction that often awaits it where there is no one with real interest to care for it. We believe these QSLs have historical meaning to the radio listening hobby, not only as a permanent record of the QSLing activities of the stations themselves but also as a memorial to the many DXers who were once active but have now passed from the scene.

It occurred to us that your members might be interested in knowing more about our project. We would be grateful if you would tell your members about us, and ask them to contact us if they feel they can help us in any way.

Sincerely,

Jerry Berg, Chairperson
38 Eastern Ave.
Lexington, MA 02173
(617) 861-8481

A YARN ABOUT RADIO SERVICE AND INSTRUMENTS

By Henry R. Kuhn

With the coming of factory-made radio receivers and the rapid growth of broadcasting, more and more people acquired sets for entertainment purposes. There were still the experimenters who essentially "rolled their own" but before long they were outnumbered by the common man to whom the radio was a mystery box. This gave rise to the creation of another element in the overall picture; that of the radio repairman. More often than not, radio repairmen came from the ranks of the experimenters and individual set builders. My mentor at Allen's Music Store in Ithaca, New York, was of that first generation of servicemen. Mr. Lueder had been in the radio repair business since 1922 and was now chief serviceman with me as his assistant in 1932.

Prior to this job I had sporadic contact with radio repairing starting in 1928. My repairs could be considered accidents rather than explicit knowledge. In the following year I made it in the broadcast field as a "gofer boy" at WOR in Newark, New Jersey, a part-time, after school job.

We often talked about the early problems and service methods. Mr. Lueder would explain that his methods had to grow with the equipment he encountered. "In the beginning the problems usually centered around improper connections to the batteries, terminal corrosion, and bad tubes. Visual inspection would usually provide detail of the failures. Even when fairly new, audio transformers would go bad. Headphones in series with a battery for 'click tests' would locate these problems. To gain a better insight to the circuits a Jewell table type voltmeter was purchased and

the old round 'battery checker' was discarded. When the 'eliminator' era arrived, the need for some semblance of resistance reading became apparent in order to locate defective components. This situation was met with the use of a low range on the Jewell multi-range voltmeter using a 'C' battery as a source. The resistance readings obtained were relative and based upon some 'standards' made up of an accumulation of various resistors."

Here we have the genesis of the volt-ohmmeter which was to become the standard service instrument in later years. With the advent of the AC operated receivers and the tubes created for this service, additional situations arose which saw the development of the "Analyzer." These were impressive devices but more often than not the results they indicated would lead the active serviceman to a more resolute method of isolating trouble. As the sophistication of the analyzers grew, the adaptability of the volt-ohmmeter method of circuit analysis became more and more apparent. Mr. Lueder would say, "First fix the set and then use the analyzer." His Jewell 199 had a facsimile scale with two ohmmeter ranges on the DC meter. This came with a kit available from a mail order house. Needless to say, I quickly made a DC volt-ohmmeter.

On the air signals would generally provide all that was needed for fundamental alignment problems with TRF equipment, but this changed with the coming of the super-het receivers. Mr. Lueder made a signal generator using the circuit taken from a *Radio News* article. Most IF frequencies were in

the 150 to 300 kc range. The instrument also covered the BC band, 550 to 1500 kc. There was one clever innovation: it was possible to check RF and IF coils detached from their circuits. This consisted of a low Z link which terminated in a connector on the generator. A twisted pair cable ran to another free link which could be placed on a coil under test. The actual coil was clipped to connectors on a box containing a '99 tube with a filament battery only and a 0-500 micro-amp meter. This box also contained a shunt 365 mmfd air condenser with a calibrated dial. Thus the tuning range of any coil could be rapidly checked. Mr. Lueder was responsible for this innovation. This was a real asset in auto radio service which was rapidly growing to boom proportions and there were many coil problems with the early sets.

More about "Pop" Lueder. There was a sports figure in the twenties called "Pop Lueder." That's where the "Pop" came from. (Football — I think Penn State.) Pop claimed to have made his own tube tester for four prong tubes in the early to middle twenties. I renewed contact with him when he was ninety and still working on radios.

S

SILENT KEYS

Bob Jensen, SCARS member, ham, member of Pacific Pioneer Broadcasters, and a fine, fine gentleman, passed away on September 8, 1987. He will be missed by many groups because he was very active in his retirement years.

BOOK REVIEW

By Joe Knight

Restoration and Preservation of Scientific Apparatus for Collections by Guy Biraud (in French and English), 400 pages, small format, with some pictures.

For those of you looking for an informative reference on the restoration techniques and crafts that you have marveled at when seeing a finely restored radio would do well in obtaining this book. By showing complete restoration procedures on scientific apparatus and a French radio, the reader is taught about a wide variety of finishes, repairs, cleanings, tool uses, and chemical solutions.

The author does not deal with circuit trouble shooting but only with the philosophy and use of restoration. An extensive glossary provides a handy reference on dealing with many materials and techniques.

To order, contact: Richard Foster. 12 Shawmut Ave. Cohituate, MA 01778. Price is \$35 postpaid.

DONATIONS

Don Dressen, SCARS member in Laguna Hills, has donated several pieces of old electronic equipment to the club. These items will be auctioned off at the May meeting. Among the items are a W.E. 205 tube, an early turn-of-the-century British low resistance bridge, and an early wireless microphone.

The Charles Busenkell estate has donated an ULTRA Hallicrafters Skyriders, vintage 1937, to the club. It will be auctioned at the May meeting. Other items include WW-II equipment, Millen grid dip coils, etc.

THE HICKOK INDICATING TRACEOMETER

By MIKE ADAMS

What's the best way to fix a radio? Believe it or not, there has been much debate over the years on the best "system" of trouble shooting. During the 1930's, John Rider wrote a book on signal tracing that probably inspired the design of several devices which could simultaneously observe the RF, IF and AF stages of a radio connected to it. Hickok's Traceometer was one of these.

Let's talk about radio repair. I have been fixing radios as a hobbyist since the mid-1950's, and after thirty plus years you draw more than a few conclusions about trouble shooting. (1) Radio repair is mostly repetitive. After you have fixed a couple dozen sets, you've fixed them all. As a matter of fact (he said boastfully) I was one of a handful in my neighborhood who could draw from memory and understand a schematic for a five-tube superheterodyne — still can. (2) While it is always desirable to have a schematic of an unfamiliar set, I have learned to troubleshoot with an RCA Tube Manual and volt-ohmmeter plus eyes, ears and touch. The latter often gets me into trouble.

Why then, the Hickok Traceometer? This attractive and well-made device was designed to be connected to all the stages of an electrically "live" superhet and give an indication of where problems existed. A good idea but overly-complex and time consuming in a business where time is money.

I have a couple of theories about devices like this. My first, however cynical, is that this device presents a colorful and baffling "show" to the customer and perhaps helped to

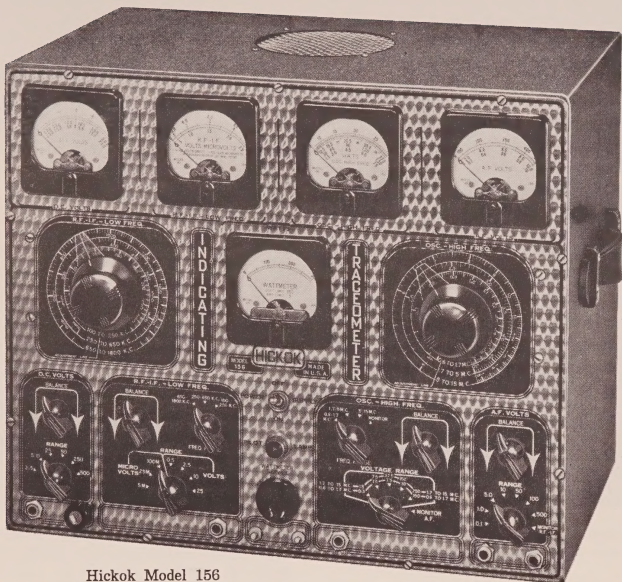
raise the credibility of the service profession. Second, some people philosophize and write about things and some people do them. The idea of a device like the Traceometer reads very well; it might cause a technician to feel like a radio doctor to use all that technology.

As one who collects test equipment, I was intrigued by the appearance of this device — I wanted to use it on my own bench. I guess I needed to identify with a 1930's repairman when first confronted with a new service aid. It was 1979 when a Downey, California, repair shop gave me the instrument during a house-cleaning. Yes, I still go to repair shops and ask for throwaways.

After getting it home, I called Hickok in Cleveland and arranged to purchase a Xerox of the original instruction manual. I made up all the various probes with their diodes, resistors and capacitors and actually tried it out on a few sets. Interesting to be sure, but it takes a long time to set up.

The Traceometer is a collection of stages — RF, IF, AF plus an AC-DC voltmeter and wattmeter. It has a built-in amplifier and speaker. All this interfaces with the stages of the radio under test. If all this seems like a lot of bother, you can always use the Traceometer and an AM radio!

Back to the Hickok story, and the major benefit of doing this article. When Ed Sheldon asked me to write about a piece of test equipment, I volunteered to do the Traceometer and immediately sent a letter to Cleveland requesting information. I was pleased to receive a detailed response from R.D. Hickok, Chair-



Hickok Model 156

man and President. Here is that letter:

Dear Mr. Adams:

The Hickok Model 155 Traceometer was manufactured from 1940 through 1949. There were test meters made by Hickok during the 1930's which could be used while the set was operating, but these did not contain the signal tracing feature of the Model 155. I am enclosing a page copy of our 1942 catalog, and a model 155 circuit diagram dated 11-29-39.

Approximately 3500 of these were made between 1940-1949, however there was no production in the years 1942, 1943 and 1944 when our facilities were devoted entirely to the production of meters and test equipment for our armed forces.

Unfortunately, we have no copies of ads. I am enclosing a copy of a catalog sheet used from 1945 to 1950.

Specialized testers for servicing television replaced the Model 156. It is a pleasure to send you this information.

Sincerely,
R. D. Hickok
Chairman and President

Editor's note: Hickok Model 155 appears to have been the pre-WWII version of the Traceometer, and the Model 156 the post war version. There are minor differences in Model 156 between early and late instruments.

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Some of the action at the flea market

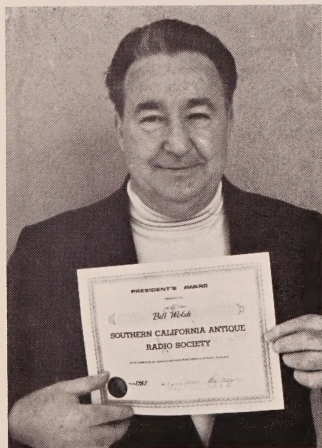


November Torrance luncheon at the Velvet Turtle





1988 Directors. L to R: Mary Curry, Walt Curry, Bill Wakefield, Ed Sheldon, Morgan McMahon. Kneeling: Mike Adams, Floyd Paul and George Fathauer. Missing are Alan Smith, Joe Knight and Bruce McCalley.



Bill Welsh and his Award

SCARS ANNUAL AWARDS

(Previous and Present)

PRESIDENT'S AWARD

- 1984 Bruce McCalley
David Stout
1985 Mike Adams
1986 . . . Roy & Kathryn Tucker
1987 Bill Welsh

COLLECTION AND PRESERVATION

- 1984 James Whitaker
1985 Paul Thompson
1986 Les Rayner
1987 Floyd Paul

HISTORICAL DOCUMENTATION

- 1984 Morgan McMahon
1985 Bill Condon
1986 Joe Smalski
1987 Walt Curry

THE MEGACYCLE METER

By Jim Whitaker

The Megacycle Meter is a simple, accurate and versatile piece of electronic test equipment that functions as:

Grid dip meter
variable frequency oscillator
an absorption wavemeter, or
tuned circuit absorption detector.

The grid dip function is the one that I have found most useful for ham radio work and for circuit design or test.

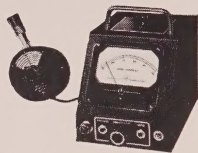
Grid dip meters go back to the 1920's and appear in magazine articles of that era. (For example, in the November 1928 issue of *Citizens Radio Call Book Magazine* and *Scientific Digest*.)

The model 59 Megacycle Meter, a modern precision grid dip meter manufactured by Measurements Corporation of Boonton, New Jersey, made its appearance in 1947 (date on owner's manual). It consists of a compact oscillator connected to its power supply by a flexible cord. The tuned circuit coil is mounted externally so that it can be conveniently coupled to other circuits. A 200 micoramp meter reads grid current. Sensitivity is improved by a 10K potentiometer control that balances out the d-c component of the oscillator grid current. Seven coils provide coverage from 2.2 to 400Mc. in seven bands. Low frequency coils were available for extending the frequency coverage down below 2.2 Mc.

In 1950 the James Millen Company of Massachusetts offered a grid dip meter for the ham radio market primarily. It also provided additional low frequency coils. By 1959 Millen, Barker and Williamson, and Heathkit offered grid dip meters for the ham radio market. Heathkit and Millen both offered low frequency

coils as options extending coverage to 350 Kc and 220Kc respectively. The Heathkit sold for \$21.95.

The June 1977 issue of *Ham Radio* magazine features a construction article on a "transistorized grid dip meter" that could be built for less than \$25.00.



Model 59 Megacycle Meter

The Megacycle Meter remains my favorite. It's very sensitive, and uses only three tubes:

955 oscillator

VR-150/30 voltage regulator

5Y3GT rectifier.

The operating instructions for the model 59 emphasize its use as a design tool for the design engineer. Some of the uses are:

1. Receiver design and alignment
2. Transmitter design and adjustment
3. Antenna and transmission line adjustment
4. Measurement of capacitance, inductance, mutual inductance, and circuit Q.

To maintain the original accuracy of the instrument, it is important to use the set of coils calibrated for use with the instrument. The serial number is stamped on top of the case and on each coil. A frequency accuracy of 2% is claimed.

I wish to thank Ed Sheldon, Morgan McMahon, and Henry Kuhn for their help in providing information for this article.

HAM RADIO TEST EQUIPMENT

By Morgan McMahon

Ham radio test equipment has gone through a major cycle over the last eighty years. First were the spark gap days with primitive instruments for primitive equipment. Then there was a period of many years in which test equipment grew with the evolution of more and more sophisticated transmitters, receivers and antennas.

Over the last two decades, however, equipment has become so *complicated* that most hams have abandoned their work with the "innards" of transceivers; their island of experimentation has shrunk to antennas, transmission, and new modes such as packet communications.

The result is that the typical ham has less test equipment than he had thirty years ago. Much of the test function is built into today's complex solid-state transceivers. True, there is a lot of fancy test hardware, but it is mostly in the hands of factories and repair centers that service the ham's solid-state equipment for a fee.

Here are some of the most important pieces of test equipment over the years from wireless to now:

RF ammeters were used in the earliest days (1910) to measure transmitter output current. Earliest was the "hot wire" type; then came the thermocouple type. These meters are still in use.

Absorption-type wavemeters were used from the earliest 1900s to detect oscillations and to measure transmitted frequencies. They have been used ever since, particularly in tuning and neutralizing transmitter amplifiers. Today they are used mostly for sniffing unwanted oscillations in r-f amplifiers.

Field strength meters have been used to sense the presence of RF energy or to measure antenna field strength. Many field strength meters are simple absorption-type wavemeters with detector diodes and milliammeters even today. More and more elegant field strength meters have evolved, first using vacuum tubes (mid-1930's) and more recently transistors (1960's). They are often combined with grid-dip meters (see below).

Multi-testers were a blessing, replacing a box full of various meters. Every ham had a multi-tester by the 1930's, either home-built or "store-bought." These were usually volt-ohm-milliammeters, with various embellishments such as decibel and ampere scales. Multi-testers will still be found in any ham shack.

Cathode-ray oscilloscopes were used earlier than you might think. By the mid-1930's some serious hams had simple oscilloscopes for checking transmitter modulation, and some even had general-purpose models for developing and trouble-shooting transmitters and receivers. They have been much-used tools ever since.

Signal generators go back to earliest days, when batteries with buzzers were used to generate RF noise to tune up crystal receivers. By the mid-1920's hams were using calibrated oscillators to tune receivers and to set transmitter frequencies. By the mid-1930's signal generators were precise, and some contained quartz crystal calibrators. After WW-II, frequency generators had many embellishments such as sweep-frequency "wobblers" for aligning receivers precisely.

Tube testers have been in general use since the 1920's. The early (and least expensive) testers measured filament (cathode) emission, as today's cheap testers still do. By the 1930's many hams had "dynamic" testers that test the true ability of the tube to do its job. **Transistor testers** became necessary in the mid-1960's. **Integrated circuit testers** are more expensive and specialized than most hams can afford.

Grid-dip meters have been the ham's work-horses since the mid-1940's. In their normal mode they are very-low-power oscillators, used to detect resonances by monitoring their grid currents. They are used to neutralize transmitters, tune antennas, tune wavetraps, and look for spurious resonances. Since they are oscillators, they can also be used to troubleshoot and align receivers. At the flick of a switch they can be used as absorptive field-strength meters and wavemeters. Properly calibrated, they can be used to measure C, L, M, and Q. Grid-dip meters are still favorites among those hams who are hardware tweekers.

Vacuum-tube voltmeters appeared in the mid-1930's, a real blessing to the experimenter because they did not disturb the circuit being measured. Also, they easily measured high-frequency r-f voltages. VTVM's are still in everyday use.

Standing-wave-ratio meters were made possible by semiconductor diodes developed in WW-II. They measure the effectiveness of r-f energy transfer between transmitters and transmission lines or antennas. SWR meters are still used even by the most technically unsophisticated hams. They are often built directly into modern tranceivers.

Electrical bridges have long been the basic circuits for R-L-C-Z-Q measurements. In the late 1950's bridges became popular among hams for measuring antenna characteristics. The development of semiconductor noise sources has made "noise bridges" very popular since the mid-1970's.

Spectrum analyzers have been used by some hams ever since WW-II. First versions called "panoramic adaptors" were used to adjust transmitters and to find clear frequencies on crowded ham bands. Very sophisticated analyzers are now used for adjusting single-sideband equipment, usually by well-financed repair centers.

Factories and maintenance shops use even more elegant equipment, such as two and three-tone signal generators and frequency counters. However, today's ham can get by with as little as a standing-wave meter, a multi-tester and an r-f ammeter, along with a good dummy antenna load. Most other necessary test and measurement functions are built into today's transceiver equipment.

Over the years, the average ham has evolved from an experimenter to a heavy technologist to an equipment driver. But be not discouraged, my friends; there is still plenty of room for experiment and development by the ham who has the interest and a bench full of the right test equipment.

GAZETTE DEADLINES

All ads, material and articles for SCARS *Gazette*:

February issueDecember 1
May issue March 1
August issueJune 1
November issueSeptember 1

Restoration Tips



— Edited by Joseph C. Smolski

CHANGING FILTERS IN FIXED-BIAS CIRCUITS

Many pre-war receivers derived negative grid bias voltages by passing plate current from all stages through a resistor or resistor network in the negative return of the power supply. In this configuration the cathodes of fixed-bias stages are grounded directly instead of through a (self) bias resistor, and the center tap of the high voltage winding of the power transformer goes to ground through bias resistors. In these circuits the negative side of at least one of the electrolytic filter capacitors in the power supply is above chassis ground. When the can is the negative terminal, it is ordinarily insulated from the chassis with a fiber washer. When replacing these units it is very important to avoid inadvertently shorting the can to ground. Doing so will not necessarily prevent the set from operating or cause any serious damage, but it can result in a number of annoying symptoms, the exact nature of which will vary depending upon the design of the set.

I recently worked on a Philco model 40-190 with such symptoms. The filters had been replaced by a previous owner, and the set suffered from audio distortion, particularly when the set was hot, birdies at the high end of the dial, and a slightly elevated hum level. A terminal strip had been added next to one of the original screw-base electrolytics. The terminal strip was too close, and was shorting the mounting nut of the old can to ground. Consequently grid bias for the audio stages was too low, which caused distortion, and the potential on the suppressor grid of the RF stage was incorrect, which

caused oscillation in that stage. The elevated hum level was also caused by the incorrect filter connection. Repositioning the offending terminal strip corrected all of these problems.

SILVER-MARSHALL CONVERSION

I recently came across an unusual Silver-Marshall Shielded Six (Type 630) receiver. Instead of the original 01A triodes, this set was fitted with a set of type 22 tetrodes in the RF amplifier positions. The RF coils had been changed from SM #118A to SM #119, and the circuit had been rewired as follows:

+45 volt supply to detector and RF screens,

+135 volt supply to RF plates,
+180 volt supply to output plate and 1st AF plate,

C- Amp (approx. -40 volts) output bias,

C- Det (approx. -3 volts) detector and 1st AF bias,

Volume control: 20 ohm rheostat in RF filament circuit.

I have found no service data corresponding to this version of the Type 630. The workmanship of the modifications was excellent. The replacement coils and sockets were supplied by Silver-Marshall. This may have been a factory modification or a factory kit installed by the set's owner. Readers who have additional information on this set are invited to write in.

J. Smolski



MILLEN FACTORY EQUIPMENT AUCTION

By FLOYD A. PAUL

(Editor's note: In 1980 the author purchased several pieces of General Radio test equipment from Tom Rutherford in Townsend, Massachusetts. In 1984 I casually wrote Tom and asked what the origin of my test equipment was. The following is the answer I received.)

Dear Floyd:

The General Radio equipment you bought from me was a small part of the two pickup truck loads that I bought when the contents of the Millen factory was put up for auction in 1978. I was very glad to be there as I was the only bidder who gave a damn about anything's value as other than scrap metal. I snagged as much historical material as I could lay my hands on. All of this equipment has since been sold to collectors all over the country as, by the early eighties, I had pretty much lost interest in the hobby. Only the old Millen brand equipment stayed pretty much in one place. Alan Douglas wound up with most of it and wrote an excellent article on the company's history for the *AWA Bulletin* (O.T.B. June 81).

As far as the auction went, it was a pleasantly strange experience for me. The building was quite old. Matter of fact it was slated for demolition as part of an urban renewal plan in Malden. There were old office furnishings, old equipment, and it was mostly like walking back into the 1940's. Apparently they had more space than they needed and when a product line ended they just moved to another set of work benches. I saw, one after the other, assembly benches with half assembled pieces of old equipment, part trays, wire, solder, etc., just like the

assembler had gone to lunch thirty years ago and never came back. The only thing telling me it was a dead line was a quarter-inch-thick layer of dust. Brings to mind tales of ships with crews missing and dinner still on the galley tables.

There was an RF engineering lab in part of the building and it was well equipped with excellent, albeit old, test gear such as you purchased — almost all General Radio stuff, with a bit of Boonton and Ballantine thrown in. In every corner, under cabinets, on top of high shelves, all manner of old equipment, prototypes of this and that, old National receivers abounded. I was flabbergasted to find in mint condition, wrapped in dust layered plastic, National SW-3, 1-10, NC-44, and NC100 receivers. I don't think they ever threw anything away.

The auction was conducted in the normal fashion for industrial auctions. The merchandise was divided into lots and it took a couple of days for the bidders to work through the whole place. Only after all the lots were sold could we start removing things from the premises. And then it was everyone for himself. If you weren't watching what you had purchased it could, and frequently did, vanish. If your stuff was on somebody else's shelf, it would wind up on the floor, and none too gently. Anyway, I scrambled like hell for a full day, making two runs home (forty miles each way) with my truck loaded above cab level and the tires bulging. There was more that I could take but I was approaching the limits of sanity (past it, according to my wife!) already, and I did get all the really important things.

To give you little insight into this rather odd scenario, a bit of Millen history might be in order. Jim Millen worked for National for years as a design engineer until in the late 1930's he ventured out on his own. Hence the large number of National pieces laying around his shop. His marketing was aimed strictly at the amateur radio hobby. The business started small, with second-hand everything. It seemed to be run very conservatively; the old office furniture was still in use until the day the plant closed. World War II came along and, apparently, with war contracts the business prospered. Looks like this was about the time that all the good deluxe equipment was purchased. They used that equipment to the end, and good equipment like General Radio just doesn't wear out.

After the war they got right back into the amateur market and had an ambitious product line for a relatively small company. Every issue of *QST* magazine carried a page or more of their advertising. At one point they got into communications receiver design and built (two) prototypes of the models. The "deluxe" is truly that. I know because I got them both. Alan Douglas now has them. I talked to one of the retired executives and he told me that they never ran production because of competition from Collins and the high price that the Millen receivers would have to have been sold for.

Things continued up into the 1970's with fewer product lines each year. By the time the plant closed there were only three active products, and the rights and materials were sold to other companies. By appearances, James Millen Co. was

pretty much a one man show: born, raised, slowed down and retired as the owner.

73's

Tom Rutherford

Typesetter's note: During the '50's and '60's I worked for a Millen distributor. We were in the industrial field, among other things, (we did not sell to amateurs nor to the public) and there was a fair demand for Millen pieces. Slowly the amateur market was drying up; the use of solid-state devices was the beginning of the end for home-built amateur equipment, and this market was Millen's forte. The industrial market looked like the "promised land" to Millen and they decided to limit their distribution by establishing a very few distributors, and cutting to others (like us) off completely. We were "stuck" with the orphans we had because they had no policy of taking our stock back for a refund, nor for even some sort of a deal to help us move it. Anyway, with their limited distribution, those amateurs who might have wanted some Millen piece found it more and more difficult to find.

In our case, we "ate" the Millen stock we had but I know of others who catered to the amateur-retail market who then devoted their efforts to other, similar product lines. Anyway, this move further diminished the market for Millen goods; the industrial market could not support his product offerings, and down the tube they went.

Millen, like National, Hammarlund, Johnson, and others made excellent quality items. As with *Radio News*, *Radio*, and similar magazines, the "radio" hobby disappeared with the increasing technology. Those firms which supplied this market died with it.

The General Radio Experimenter published by the General Radio Company. The Experimenter was published every month over thirty years. It is a good source of information on the instruments made by GR, as well as its history and personnel. A must if you collect General Radio instruments.

Electrical Measurements, 1938, by Frank B. Laws. This book is a good source of information on potentiometers and bridge circuits for the measurement of resistance, inductance and capacitance. This book was intended for third year students in electrical engineering and is somewhat theoretical.

Weston Engineering Notes, published by Weston Electrical Instrument Co. Starting in February 1946, the Weston Engineering notes were published six times a year up to 1960; perhaps longer than that. These notes are a good source of information about the Weston company and its products. It is very readable and not particularly technical. Very helpful if you collect Weston instruments.



LETTERS FROM MEMBERS

Dear Joe:

Enjoy the *Gazette* very much and especially the 'new look' the November issue has.

Ray Nemec
Baseball Research and Statistics
Naperville, IL

Dear Mary:

I am a (retired) electronics engineer with about thirty years's background in this field at Ryan Aircraft (now Teledyne Ryan Electronics) in San Diego. My earliest radio is a one-tube (type 99) Crosley with the

original warrantee attached, and employing the Armstrong 1914 patents, but I also have representative models through the '20's, '30's, '40's and '50's.

I look forward to meeting or corresponding with members of the Society. Thank you for your response to my question about the video tape.

Charles Bates
Chula Vista, CA

Dear Mary:

Please find enclosed \$15 in U.S. currency. I enjoyed the *Gazette* very much, partly due to the fact that I grew up in Detroit and information from California is all new to me. I have obtained an Aussie-made Radiola 120 which appeared in the last Australian newsletter, perhaps the most original cabinet ever made. I haven't seen any American or British sets that resemble it. There are quite a few early U.S. AC sets here, as Australia didn't start until 1930 with their own.

We are heading into summer here and I imagine it being cool but not severe as I remember Detroit where I can recall walking backwards to school wasn't unusual when a strong wind was blowing.

Darryl Kasch
Australia

Mrs. Curry:

Here is our dues for the coming year and for the November luncheon.

We have really enjoyed being in the club and getting the *Gazette*. We have learned so much about radios this last year and it really has helped us a lot. I am looking forward to next year.

Deanna Hames



MINUTES OF SCARS MEETING

November 21, 1987

Velvet Turtle Restaurant
Torrance, Calif.

The meeting was called to order at 11:15 A.M. by Paul Thompson, president. Paul welcomed SCARS members, spouses and guests. Paul then reminded the membership that officers are not eligible for awards, however he wanted to compliment Mary Curry for her hard work and diligence as treasurer. She was given a round of applause.

Mary Curry, treasurer, gave her report, stating that the club finances are in good order with over \$5000 in a CD account, and \$4000 in an interest-bearing checking account.

Ed Sheldon, secretary, then asked for a vote to accept the minutes of the previous meeting of August 15, 1987 as published in the November *Gazette*. This was moved, seconded and passed. He then presented a list of forty-three applicants for membership in SCARS. These applicants were voted into membership.

As chairman of the Awards Committee, Ed Sheldon then announced that the awards selection committee members were Allen Smith and Paul Thompson. The 1987 Awards were then presented to the following persons:

Historical Documentation. Floyd Paul.

Collection and Preservation. Walter Curry.

President's Award for service to SCARS. Bill Welsh.

This was followed by the program, a stage recreation of two radio comedies by a group known as "30 Minutes to Curtain." We thank this group consisting of Ted Zaske, Frank Finn, Ruth Marcus, Dave Smith, Ed Hayes, and Jon Hughes (engineer) for a most entertaining program.

The following persons were proposed, nominated and elected as SCARS officers for 1988: Mike Adams, president; Walter Curry, vice-president; Mary Curry, treasurer; and Ed Sheldon, secretary. The following persons were proposed, nominated and elected to the Board of Directors for 1988: Paul Thompson, Morgan McMahon, Bruce McCalley, Floyd Paul, Allen Smith, Joe Knight, George Fathauer, and Bill Wakefield. The Board of Directors also includes the officers.

Roy and Kathryn Tucker, contest chairpersons, presented the contest results and gave the awards to the winners.

Ed Sheldon
Secretary

EQUIPMENT JUDGING REPORT

November 1987 Meeting

By Roy & Kathryn Tucker

With about one hundred in attendance at the banquet, ideal conditions prevailed for a vote by the membership of the "most popular" plaque. Those voting did not know what the judges had decided at the time of their voting. There was a very close vote between the two entrants with Crosley 1920's regenerative receivers and the World War II U.S. Navy equipment. By a slight edge the most popular, as the members saw it, was Mary Rasada with her Crosley Pup one-tube receiver. What made it especially popular undoubtedly was the incorporation into the display of two small advertising pups which the manufacturer had used in promoting the receiver's sales. The voting by the membership regarding most popular to a very great degree matched with the judge's views. The highest judge's score was on the Crosley group of three simple receivers by

Dan Steele, who also had a number of embellishments to make his display much more than just a static showing of equipment.

August Link's World War II equipment looked like it was just off the assembly line and was shown in an interesting format in that equipment from the previous war (WW-I) was along-side for comparison to show what just a quarter of a century had produced in electronic equipment.

One new rule change was announced by the contest co-chairmen. To encourage working displays, all future contests will include an automatic award of ten points on the judge's score for any item that is intended to operate and is displayed in working condition. Working displays have been included in each of the last two SCARS exhibit contests.

CONTEST RESULTS

Category IIA - 1920's, simple

1st. Dan Steele. Crosley receiver group of three

2nd. Mary Rasada, Crosley Pup

Honorable Mention. Les Rayner, Grebe CR-18

Category IIB - 1920's, complex

1st. Charles MacQuarrie, 1928 Brunswick and RCA 103 loudspeaker

2nd. Kevin Hermann, Ware Neutrodyne Type T

Honorable Mention. Atwater Kent 45 and loudspeaker

Honorable Mention. Oral Boudreau, Stewart Warner 300 and loudspeaker

Category III - Armed Forces

1st. August Link, U.S. Navy WW-II transmitter and receiver

2nd. August Link, U.S. Navy WW-I Type E transmitter

Honorable Mention. August Link, U.S. Army WW-I SCR49

Open Category

1st. Oral Boudreau, vacuum tube display

2nd. Charles MacQuarrie, Colonial "New World" 1930's receiver
Honorable Mention. Wat Dantui, Gilfillan 86U

Honorable Mention. Oral Boudreau, Guild Radio 484

Honorable Mention. Charles MacQuarrie, Deluxe Masterpiece 1930's receiver

Non-Judged Education Category

Paul Giganti, British crystal receiver and WW-I U.S. Army telegraph

Roy and Kathryn Tucker, I.S. Army WW-II porcelain antenna insulators.

Judges were Deanna Hames, Larry Kenan, and Jim McWilliams.

CATEGORIES FOR JUDGING FEBRUARY 1988 MEETING

Category I, Radio equipment of any type made outside the United States prior to 1942

Category II, Radio equipment of any type entered jointly by two members in a family

Category III, Homebrew or replica radio equipment of any type representing the period prior to 1942

Category IV, Cathedral or tombstone broadcast receivers.

PARKING

Swap meets are growing in size. At Burbank parking is limited so we are asking buyers to park out on the street. Sellers should occupy one spot unless you have a van with many things to sell. Please, vans, use only two spots.

SELLERS

Note: Only SCARS members are allowed to sell at SCARS meets.



For Sale or Trade & Want Ads



ADS MUST BE SUBMITTED EACH TIME FOR EACH PUBLICATION AND ARE FOR PERSONAL USE ONLY. SCARS WILL NOT PRINT REPETITIOUS ADS. ALL ADS ARE SUBJECT TO EDITING. SCARS IS NOT RESPONSIBLE FOR ANY TRANSACTION OR THE CONDITION OF ITEMS ADVERTISED.

WANTED — Magnavox speaker for Sparton 930, or any 9 to 12 inch speaker. 2500 ohm field coil, 8 ohm voice coil. Center-tapped primary for dual 182's or 71A's output. H. W. Hunt. 2710 Wendy Place. Port Hueneme, CA 93041. (805) 985-7874.

WANTED — Radio related advertising and promotional items such as toys, banks, window displays, novelties, manufacturer's playing cards, etc. Jack Gray. 1162 Broadmoor Drive. Napa, CA 94558. (707) 226-2550.

WANTED — Copy of operating instructions and schematic for Triumph Model 420 tube tester. Also want a speaker for a Brunswick 5-KR radio. R. M. Deschenes. 10329 Plaza Paseo Drive. Lakeside, CA 92040.

WANTED — Crystal sets. William J. Moran. 45 E. Huntington Drive. Arcadia, CA. (818) 574-1670 (collector).

WANTED — Table radio, RCA model 1064, chassis B274, or RCA 1058-B274, or any table model RCA built in the years 1943 to 1958. Please call collect and give price and shipping COD. (707) 425-4578. (Ed. note: the chassis number would be RC—; the "274" is RCA's Radio Manufacturer's Code number.)

WANTED — SX-7 Hallicrafter, in any condition. This has aluminum-finished panel and aeroplane type dial. Also Model SX-9. This is similar but with a German silver dial. David Medley, K16QE. 1450 Bayview Heights Drive. Los Osos, CA 93402.

WANTED — Magazines (or copies) of Los Angeles radio history, 1920-1940. Borrow or buy. *Radio Magazine*, 1931-32. Select copies of *Radio Journal*, *R/9*, *Technician*, etc. F. A. Paul. (818) 242-8961.

WANTED — Radio-Victor Electrola reproducer, part number 60250, in good working condition, for restoration of a 1929 RCA Victor Model RE45 combination radio-phonograph. David E. Smith. 40 Cortez Drive. Florissant, MO 63031.

WANTED — Chassis for Fada 652. Dial glass for Fada 652 and Sentinel L-284. Sames 1 to 100. Steve Elkins. (213) 935-5572.

WANTED — *Radio Digest* magazines, 1927-1932, and *Radex* magazines 1924-1942. Ray Nemec. 1424 Heatherton Drive. Naperville, IL 60540.

WANTED — Original socket assembly and/or mounting brackets for a Radiola III. Also a cabinet for a Kennedy V. Oral Boudreau. 9551 Harriet Lane. Anaheim, CA 92804.

WANTED — Peter Pan radios by Jackson Bell. Philco 20B and 70B. Majestic 370. Don Hames. 7700 Reynolds Ave. Bakersfield, CA 93307. (805) 845-2426.

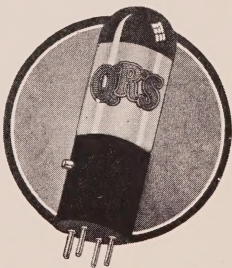
FOR SALE — Mint Kiel table AK60 and mint Guild rolltop desk/radio phonograph record changer. Peter Pan phonograph. SASE. George E. Brehm. 13402 Leibacher Ave. Norwalk, CA 90650. (213) 864-8857.

EMBARRASSED — Will the gentleman who bought and paid for two #30 tubes at the Torrance meet please send me his name and address so that I can ship the tubes. Paul Thompson. 315 Larkspur Drive. Santa Maria, CA 93455. (805) 934-2778.

FOR SALE — Rider TV manuals, Vols. 1 thru 27 complete, average condition. Will consider break-up. \$6 to \$15, or \$65 for set. Also various post-war TV's. Call for list. Charles Murray. Los Angeles. (213) 475-0111.

FOR SALE — Or Trade: Philco 70's, 90's. Erla clock cathedral. AK 447. Remler and Aztec cathedrals. German sets. Walton's radio. **WANT** — AK 558 cathedral, breadboard or parts. All foreign radios, tube-type HiFi equipment. Pilot radios. Unusual and large shortwave sets. Bill Moore. 100 S. Fieldstone Ct. Huntsville, AL 35803. (205) 880-1207.

FOR SALE — Unusual art deco "Dolly Parton" Emerson BD-197 wood table radio. See *Radio Age* November 1987 issue. Radio is in good condition except finish has been stripped off. Electronics have been restored and set works very well. \$300. H. Brams. 2427 Durant. #4. Berkeley, CA 94704. (415) 841-5396.



Redtop
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ANNOUNCEMENTS

NEW MEMBERS

November 21, 1987

Harry Alenik
Joe Almeciga
James & Joyce Barner
Charles Bates
Jim Bellard
Richard Birbeck
Rodney Blauer
Edward Chalpin
David Colombo
Dave Crocker
John Curtis
Peter Cutler
Steven d'Adolf
Rick Difiore
R.M. & Norma Deschenes
Steven Elkins
David Gilbert
Tobert & Diana Glanville
Maurice Greeson
Elizabeth Herndon
Ed Hogan
Robert Hubbes
Harold Johnson
Bob Lane
Henry Laub
Carol Leeth
Robert Luederman
Ralph Majors
Raymond Moore
Raymond Nemec
Roy Oakley
Chris Odgers
George Oswell
Peter Pitcher
Jay Procenko
Hal Propp, Jr.
David Reid
Tony Rimmer
Adrienne Sherwood
Ernest Simon
Eugene Taylor
Larry Valasco
Sam Wrenn

ANNOUNCEMENT

Radio Collector video series on KLCS (Chan. 58) in Los Angeles has been changed to begin April 9 for ten weeks at 12:30 P.M.

CHRS SWAP MEET invites SCARS members to the March 26 meeting starting at 7 A.M. The location is Grange Hall, 2880 Broad St. San Luis Obispo, CA. Call Dan Steele for information (805) 544-2904.

1988 MEETINGS

The four quarterly SCARS meetings are planned for the third Saturdays of February, May, August and November. The February, May and August meetings are planned for the Burbank location (Lockheed Employees Recreation Club, 2814 Empire Ave. Burbank). The November meeting is planned for the Velvet Turf Restaurant in Torrance, California. Put these dates on your calendar.



GAZETTE DEADLINES

All ads, material and articles for SCARS *Gazette*:

February issue December 1
May issue March 1
August issue June 1
November issue September 1

PACKARD BELL

Does any member have any information about the Packard Bell company of Los Angeles in the pre-war or early post-war years? Production and sales information, and information about pre-war sets is desired for articles to appear in the *Gazette*. Call Floyd Paul at (818) 242-8961.